

**Draft Report of the
MAINE BROADBAND ACCESS
INFRASTRUCTURE BOARD**



**November 2005
Revised 11/28/05**

**SUBMITTED TO THE TELECOMMUNICATIONS
INFRASTRUCTURE STEERING COMMITTEE**

TABLE OF CONTENTS

TABLE OF CONTENTS	2
EXECUTIVE SUMMARY	3
BACKGROUND	5
RECOMMENDATIONS	10
<i>1. Broadband Development Authority</i>	<i>10</i>
<i>2. Incentives and Funding.....</i>	<i>12</i>
<i>3. Increase Awareness and Demand.....</i>	<i>17</i>
<i>4. Broadband Demonstration Projects</i>	<i>18</i>
CONCLUSION.....	19
APPENDIX A – Taxation Policy	20
High-Technology Investment Tax Credit	20
Telecommunications Property Tax.....	20
APPENDIX B –Technology and Means of Delivery Committee	22
APPENDIX C – Regulatory and Financial Assessment Committee	26
APPENDIX D – BAIB Sub-Committees and Goals	27
APPENDIX E – Other States	30
GLOSSARY	31

EXECUTIVE SUMMARY

In his 2005 State of the State address, Governor John E. Baldacci stated: *Tonight I am announcing “Connect Maine.” A broad and aggressive telecommunications strategy for this State. Connect Maine will give nearly every Mainer the opportunity to plug into the global economy from their community. It will ensure that 90% of Maine communities have broadband access by 2010...*¹

As reflected in the Governor's Executive Order (41 FY 04/05), our State goal should be to achieve universal broadband service available to all citizens, businesses, and institutions by 2010. To be meaningful, universal service also requires that the service be affordable and the quality of service (bandwidth, reliability, synchronicity, and security) available to home, business, and large users be adequate and comparable to what is available in other regions of the country. Quality standards are not static; they will increase over time as technology and demand create higher levels of need. Further, the broadband needs of small businesses are typically greater than the need of residential customers, and the needs of large enterprise/institutional users greater still.

The State should recognize that access to broadband services is a necessity. It is critical to the ability of Maine citizens, businesses, and institutions to participate in our global economy, to create, enhance, and preserve local economic development and employment opportunities, and to retain our human capital.

The Broadband Access Infrastructure Board (Board), one of three boards created by Governor Baldacci to advance the goals of the *Connect Maine* initiative, was created by Executive Order 41 FY 04/05 (dated May 6, 2005). The Executive Order states: “The Board will focus on how to expand the availability of broadband services throughout the State to private

¹ State of the State Address by Governor John E. Baldacci, January 25, 2005.

homes, businesses, public and private educational institutions, research centers, and other entities that would benefit from such services. The Board's objective will be to provide for universal broadband access by 2010."

This report provides the results of the work of the Board and discusses the following primary recommendations for achieving universal broadband service:

- 1. Create a Broadband Development Authority.**
- 2. Provide Incentives and Funding for Broadband Expansion Projects in Unserved and Underserved Areas.**
- 3. Increase Awareness and Demand.**
- 4. Develop Broadband Demonstration Projects.**

BACKGROUND

According to the Michigan Economic Development Council, “[i]mproving access to high-speed telecommunication services is the most important state economic infrastructure issue for the new century. Whether for business, government, healthcare, or educational purposes, higher speed ‘broadband’ access is increasingly becoming a necessity – not a luxury.”² This Board would go even further to say that broadband access IS a necessity.

After establishing the notion that broadband access is a necessity, the board examined how to best reach this goal. The board decided to divide its responsibilities into three separate subject areas and subcommittees: Service Availability (“Where We Are Now”), Technology and Means of Delivery, and Regulatory and Financial Assessment, and Expansion Plan (“How We Get There”). Each subcommittee has met regularly since July.

The subcommittees of the board reviewed extensive information regarding current availability of broadband service, funding mechanisms and regulatory issues, and delivery mechanisms and technologies. The ideas from the subcommittees are incorporated in the text of this report, along with specific subcommittee resources (charts and tables attached as appendices), comments regarding the first draft report, and recommendations of the board.³

² “LinkMichigan” Policy Paper, Michigan Economic Development Council, May 14, 2001.

³ Comments were received from the Telephone Association of Maine (TAM), the New England Cable & Telecommunications Association (NECTA), and the Office of the Public Advocate (OPA).

The Service Availability subcommittee studied current availability of broadband service in Maine. First, “broadband” had to be defined. This subcommittee decided to concentrate on “basic” broadband service that provided at least 1.5Mbps downlink and 256Kbps uplink bandwidth.

For purposes of this report and to develop long-term policies the Board decided that the definition of broadband would include three general tiers of data communications consumers: Home, Business, and Enterprise, whose needs in terms of bandwidth, speed, reliability, and speed of data communications are illustrated in the table in Appendix B. A bandwidth requirement for all three classes is a rapidly moving target, and the direction is always upward with a steep rate of increase. It is difficult to pin down a solid number. For example, the Federal Communications Commission (FCC) classifies an Internet connection of 200kbps as “broadband” without reference to whether that speed is upstream or down. That standard is considered by this Board to be woefully out-of-date. Contrast this figure with what today’s typical broadband consumers of DSL are tolerating, but beginning to chafe at: speeds of 3Mbps down and 512kbps up. Therefore, we recommend that policies enacted as part of this comprehensive program focus initially on a basic connectivity level of 1.5Mbps downlink and 256 kbps uplink, but that the definition be regularly and carefully reviewed and revised as necessary.

PUC Staff solicited availability data from providers by emailing a letter and protective order to all Digital Subscriber Line (DSL), cable modem, and wireless service providers to

supply information on broadband services.⁴ The service availability committee developed a methodology and set of questions that was acceptable to all participating companies.⁵

We also solicited information from municipalities. We have not heard from 100% of towns, but to date, only one (Ellsworth) has responded in the affirmative to the question, “do you provide high speed internet to your citizens?”

The analysis we could do is only as good as the data we received, and the data is not perfect. The only way to get a completely accurate count of the number of homes that have and do not have broadband would be to conduct a house-to-house survey. For example, DSL is generally available 18,000 feet from a telephone central office or remote terminal that has the required equipment. For purposes of this analysis we assumed a 15,000-foot radius around the central offices or remote terminal that we knew to be DSL equipped (allowing for the fact that

⁴ The request went to all providers that we were aware of at the time. We expect that there were providers, in particular small wireless companies that were unintentionally and inadvertently left out.

⁵ From ILECs, CLECs and ISPs:

1. The location of each Central Office or Remote Terminal that is capable of serving DSL to customers as of September 1, 2005.
2. The locations you plan to be capable of serving by September 1, 2006.

From Cable Companies:

1. The streets on which you are capable of providing cable modem service as of September 1, 2005.
2. The streets you plan to be capable of serving by September 1, 2006.

From Wireless Companies:

1. The location of your towers capable of providing broadband service and their service radius as of September 1, 2005.
2. The locations you plan to be capable of serving by September 1, 2006.

From Electric Companies

1. Locations where you are capable of providing broadband service over powerlines as of September 1, 2005.
2. The locations you plan to be capable of serving by September 1, 2006.

not all roads radiate directly from the CO). However, we know that there are homes within the 15000 feet that cannot get DSL because of technical problems with the loop to the house (e.g., load coils).

We have a similar limitation with the data from wireless providers. Their signal is generally available within an X mile radius from their tower/equipment but that assumes that it is traveling over flat land. An obstacle such as mountain would significantly reduce the service area. There is also a significant limitation to the cable data. Cable companies are franchised by each municipality in which they provide service. However, within any municipality there will likely be a road or roads where the cable company does not deploy facilities. To exclude these homes, we would have to invest significant time and materials into the study.

Given these limitations, **a best effort estimate is that as of September 1, 2005, over 170,000 Maine residents do not have access to broadband service, which equates to nearly 75,000 households.** This means that approximately **14%** of Maine households do not have access to basic broadband service.⁶ This 14% is spread over the entire state, largely in sparsely populated areas.⁷ The largest census blocks with absolutely no broadband are in Jonesport, Holden, Mexico, Howland, and Paris. There are also several towns with virtually no service, such as: Appleton, Somerville, Northport, Georgetown, Orland, Penobscot, Eastbrook, Lebanon, Industry, Weld, and Athens. As important is the information regarding households without

⁶ 2000 Census, Maine State Planning Office, (Total occupied housing units = 518,200, population = 1.275M, 2.39 = average household size).

⁷ In providing the PUC with the data, the carriers required that the PUC agree not to disclose the map.

broadband access, the information also indicates that most businesses in the same areas do not have access to affordable broadband services. This is especially true for those small businesses that cannot afford to obtain T-1 or other private line service from their local telephone company.

Despite the limitations of the data, there is work to be done in reaching our goal of “universal access to infinite bandwidth.” To reach this goal, the board developed the four following recommendations:

1. Create a “Broadband Development Authority.”
2. Provide incentives and funding for expansion of broadband infrastructure in unserved or underserved areas.
3. Increase awareness and demand for broadband services.
4. Develop Broadband Demonstration Projects.

RECOMMENDATIONS

1. Broadband Development Authority

The Legislature should create a permanent development authority to implement State broadband policy (Broadband or “ConnectME,” Development Authority).⁸ The authority would draw from expertise in several existing State agencies, including the Department of Economic and Community Development (DECD), Office of Innovation (within DECD),⁹ Office of Information Technology (OIT), State Planning Office (SPO), and the Public Utilities Commission (PUC), but it would be primarily staffed by and housed within a single agency, such as the PUC. The authority, directly or through its parent agency, would have rulemaking authority and access to a professional staff. It would be independent of competitive providers of broadband services. The authority would monitor broadband installation in Maine, maintain and publicize information on broadband availability, demand, and funding mechanisms. It would obtain and maintain current data and maps on broadband availability in all locations of the State.

The authority would study and recommend regulatory changes to enhance broadband use in Maine. It would also identify unserved areas of the State, develop proposals for broadband expansion projects, demonstration projects and other initiatives, and administer the process for selecting and specific broadband projects and providing incentives.

⁸ TAM recommends that there be a single independent Authority to oversee all of the ConnectME initiatives. Within this Authority should be separate boards dedicated to the individual initiatives. This would indicate that the Governor considers broadband and the other ConnectME issues a priority and that the State is willing to take meaningful steps to actively promote these economic development opportunities.

⁹ <http://www.maineinnovation.com/>

A more bold organizational change would be to create a Cabinet-level position to provide a statewide strategic and tactical coordination for telecommunications and information technology purchasing, systems, services, and staffing. It would unify all state technology resources, including the Broadband Development Authority, under one office and establish an aligned information technology vision and mission for the state. This would facilitate the state being an anchor tenant and demand aggregator for broadband services.¹⁰

The authority should be the repository of information regarding funding sources, service locations and availability, as well as planning assistance and analysis tools. For example, knowing where communications infrastructure is located and the capacity or quality would assist companies contemplating relocation and municipalities in planning and budgeting.

The authority should also establish a “Broadband Infrastructure Clearinghouse” mechanism to aggregate data on available telecommunication infrastructure and services and provide a source of alternative information on broadband options and available infrastructure.

Developers and others planning for their telecommunications needs must have access to information that lets them know what is available where, with specific information on timing expectations for service installation. Another concern stems from the large amount of uncoordinated infrastructure being installed across the state. Utilities, railroads, and others have installed fiber and advanced switching capabilities across the state with little or no knowledge of government officials. If unregulated, there are currently no requirements to report such investment, even if such infrastructure is leased to a retail carrier. With similar concerns, the states of Oregon, Pennsylvania, and Tennessee have implemented laws compelling telecommunication and information vendors to provide information about their network capabilities and the locations where advanced services are available (from LinkMichigan report).¹¹

¹⁰ Also proposed by the PK-20 Telecommunications and Technology Infrastructure Board

¹¹ IBID footnote 2.

The broadband development authority should recommend longer-term regulatory changes to be implemented through either legislation or rulemaking at the PUC.¹²

2. Incentives and Funding

Without a coordinated and effective national policy and resource commitment regarding broadband, states need to construct their own, specific and targeted broadband expansion policies.¹³ The Board discussed many possibilities for this policy. Some recommended policies that may “advance the ball,” but not require substantial amounts of public funds. Others would require substantial investment in infrastructure, much like for public highways.

The Board decided that we should encourage expansion in a technology-neutral and competitively fair manner. In the more rural areas of the state there may well be a wireless solution. We should provide “gap” funding to those providers and fund programs that increase the visibility and demand for broadband. Current USDA/RUS low-interest loan programs are available but little used in Maine. We should increase awareness of these programs and use state

¹² A number of Board members and subcommittees discussed regulatory flexibility and neutrality, but no specific recommendations are offered. Some also recommended changes to the method of video service franchising, but no consensus was reached and it is not clear to what extent it would increase broadband availability.

¹³ There is Federal policy that provides for USDA/RUS broadband funding and a number of proposed pieces of Federal legislation that explicitly deals with broadband.

funds to help meet the USDA/RUS 20% match requirements and the state should create new low-interest loan programs for broadband investment.¹⁴

The state should provide a mix of tax credits and direct state funding, possibly funded through a bond issuance (see LD 806, “An Act to Authorize A General Fund Bond Issue To Encourage Rural High-Speed Internet Access,” from last legislative session), for incremental and stand alone capital investments to provide broadband service to unserved or underserved areas.

The existing High-technology Investment Tax Credit program should be reviewed and revised with legislation to allow both major (telecommunications and cable companies) and minor broadband service providers access to tax credits for incremental infrastructure investment. The definition of “high-technology activity” needs to be adjusted, as well as the definition of “eligible equipment” to allow the widest applicability for real broadband expansion. This tax credit program would be more utilized with better promotion of its availability.¹⁵

In a previous study prepared for the 120th Maine Legislature, this issue was also discussed:

Taxation Policy: Many policy experts equate the rural deployment of broadband access to the rural electrification efforts of the early 20th Century. In the case of electricity, the federal government was an active partner in the rollout of service to the rural regions of the U.S. The government subsidized the infrastructure resulting in the nationwide deployment of household electricity. The question that remains is whether the development of broadband rises to the same level of necessity as electricity. To subsidize a non-necessity would utilize public money to finance private market endeavors.

¹⁴ The Office of Community Development, DECD, with support from the PUC, was suggested, also FAME has experience with loan programs.

¹⁵ 36 M.R.S.A., § 5219-M

In Maine, two major taxation steps have been taken by state government to assist telecommunications development and high technology investment. This tax policy is an example of a tempered response to the taxation questions posed above. The high technology investment tax credit and the rescheduling of the telecommunications property tax have assisted the growth of telecommunications infrastructure without infringing upon natural market forces. Maine State Government has taken prudent and effective course through this policy arena. Looking at the two tax policy shifts give a good picture of a high technology friendly state, which allows competitive market forces to command the natural rate of investment and deployment (See Appendix A for more detail).¹⁶

In addition to tax policy changes, the Board recommends that target areas for expansion would be identified and broadband investments solicited through a competitive RFP process managed by the Broadband Development Authority open to any provider, including telecom and cable companies. The RFP would be technology neutral and would select the provider able to provide the highest level of service in the targeted area at the lowest cost.

The BDA will administer a pool of financial incentives for broadband expansion. The pool will include:

- Access to existing and new low-interest loan programs for broadband expansion, along with direct State funding of part or all of required loan match contributions. The BDA would facilitate awareness and access to existing loan programs such as the USDA RUS program and the State would fund additional low-interest loan programs.

¹⁶ THE NEXT STEPS TOWARD THE LAST MILE, Prepared for the 120th Maine Legislature, Joint Standing Committee on Business and Economic Development, Joint Standing Committee on Utilities and Energy. Prepared by the Telecommunications Working Group, December 5, 2001

- State and local personal property tax exemptions for incremental broadband investment in unserved and underserved areas, if the BDA certifies the investment as eligible. For equipment and facilities subject to local personal property taxes, the municipality must consent to the project's eligibility.
- State sales and use tax exemptions for certified incremental broadband investment.
- Eligibility for the High Technology Investment Tax Credit for certified incremental broadband investment (statutory revisions needed).
- Direct State grant funding for certified incremental broadband investment. Grant funding would be provided through a bond issuance. Bonds could be State general obligation bonds or debt service secured through a pledge of future USF funds.

The BDA will identify areas of the State that are unserved or where there is inadequate available broadband service. The BDA will also identify any needs for investment in large capacity broadband facilities or interregional broadband infrastructure. Communities, businesses and institutions will be encouraged to submit broadband investment proposals with an appropriate needs analysis, including any proposed local funding or support mechanism or commitment from users to take service over a specified term.

The BDA will determine which identified broadband infrastructure needs are unlikely to be met by market participants without support. The BDA will develop a prioritized list of needed broadband expansion projects that require financial support. The BDA will solicit

market participants and other potential investors, through an open competitive RFP process, to propose broadband infrastructure investment for identified project areas and to bid for a mix of incentives listed above to make the investment viable. The RFP process will be technology and provider neutral, available to all providers with demonstrated financial and technical capability and to all broadband technologies with demonstrated performance. Municipalities, non-profit entities, and cooperatives would be eligible to participate. The BDA will select the best value proposal to fund a particular broadband expansion project.

We also recommend that, similar to recommendations from the WTIB, that broadband providers be allowed access to state towers, facilities, and rights of way.¹⁷

Access to the Maine Universal Service Fund should also be considered.¹⁸ The MUSF could be bifurcated into two parts by PUC rule. One section to provide high cost support for rural incumbent telecommunications companies and the other to provide funding for cellular tower construction, direct broadband facility construction, and debt service on broadband development bonds. The challenge will be to develop an MUSF assessment method that more accurately reflects the communications needs of the state. Currently, only telecommunications companies pay into the fund. An RFP process should be used to determine need and providers.

¹⁷ Promoting Broadband Access Through Public Rights-of-Way and Public Lands, NARUC, July 31, 2002.

¹⁸ TAM commented that broadband service is not an appropriate use of the MUSF as it does not fit within the goal of the MUSF to support basic telephone service. Any broadband expansion program should be funded through state bonds.

3. Increase Awareness and Demand

Many of the current providers have stated that part of the economic calculation for determining where to install new infrastructure is the expected return based on the expected take rate. In many cases take-rates are less than 10% and often less than 20% of the households where some form of broadband is available.¹⁹ Increasing the awareness and then the expected take-rates would “lower” the threshold for deciding where to place broadband investments. There is a program in Minnesota whose goal is to increase broadband utilization rates from 15% to 50% by 2005, conducted by the Blandin Foundation.²⁰

The Board discussed many ideas to increase the public's awareness of the need for and uses for a broadband connection at home such as: a public education program involving PSA's and media events;²¹ a program to encourage telecommuting by state and local employees; and a coordinated effort to provide more state and local government services on-line (perhaps with discounts or incentives for on-line use). We recommend that the Broadband Development Authority study these ideas in more depth and be authorized to implement these programs.

In addition, the State could encourage more rapid broadband installation by fully funding the "laptop" program at levels sufficient to bring high-speed computers to students in all high

¹⁹ We have found very few examples of other states addressing broadband availability from the take-rate perspective. The “ConnectKentucky’s” plan refers to public education but does not outline any specific programs (see Appendix E for more examples).

²⁰ The Blandin Broadband Initiative, “A Broadband Strategy for Minnesota,” www.blandinfoundation.org.

²¹ The Canadian “Community Access Program” that provides public internet access using wireless hotspots in rural and remote areas could be a model for a statewide awareness publicity program focusing on wireless hotspots.

schools. As students see the capabilities of high-speed connections at school, they and their parents will purchase what is available at home, encouraging the expansion of broadband availability.

4. Broadband Demonstration Projects

The Board recommends that the state grant funding for broadband technology demonstration projects in unserved areas and develop an RFP process to enable all providers and technologies to participate. The BDA would also administer and provide funding on a competitive basis to certified broadband technology demonstration projects in Maine. A “Citizen’s Advisory Board” should be considered to assist in developing a list of projects that will be eligible for funding, either in whole or to fill gaps. Municipalities and cooperative groups should be encouraged to develop projects, especially using wireless technologies.²² While some states have limited or prohibited municipalities from providing broadband access systems, the Maine Legislature acknowledged that Maine cities and towns already have that authority under the “home rule” provisions of the state constitution. LD 1128 (An Act Directing the State Planning Office to Study Municipal Capabilities to Become Providers of Internet Services) was proposed to clarify that authority, but the language was removed as unnecessary.²³

²² Any municipality that seeks to participate in the RFP should be required to offer a local Tax Increment Financing (TIF) on property devoted to the incremental build-out and offer local tax incentives to the same degree that the state is willing to provide tax incentives.

²³ See proposed legislative examples from the last session: LD 806, An Act to Authorize a General Fund Bond Issue to Encourage Rural High-speed Internet Access; LD 1128, An Act Directing the State Planning Office to Study Municipal Capabilities to Become Providers of Internet Services; LD 1440, An Act to Encourage the Implementation of High-speed Internet Access in Rural and Isolated Areas.

CONCLUSION

The Board believes that the only goal that will make Maine competitive is “universal access to infinite bandwidth.” The competitiveness of any state in the union depends in no small part on its ability to promote the growth of high-technology business and commerce that accompanies high-speed data connectivity, a crucial component of which is universally available, secure, affordable, scalable, high-bandwidth access to the internet. Only a state that is a supremely attractive place to conduct business, to shop, and to participate in an increasingly online culture will be able to staunch the exodus of youth and brainpower that is of such concern in Maine.²⁴ A well-conceived strategy will take into account the three tiers of broadband consumers, what we have termed home, businesses, and enterprise. It will further address three major levels of infrastructure: the connectivity of ‘big pipes’ or ‘backbone’ into the state; interregional connectivity from the backbone to the various towns and cities; and finally, intraregional connectivity that bridges those nodes to the individual home or business premises.

This report outlines a framework for moving ahead on this issue and concludes that there are a lot of options and alternatives available to meet the goals of this vital initiative which will provide technological tools for helping to improve Maine’s economy and citizenry.

²⁴ Presiding Officers’ Advisory Task Force On Creating A Future For Youth In Maine, January 2004, Recommendation #11, “Implement Universal Rural Broadband Access Statewide.”

APPENDIX A – Taxation Policy²⁵

Many policy experts equate the rural deployment of broadband access to the rural electrification efforts of the early 20th Century. In the case of electricity, the federal government was an active partner in the rollout of service to the rural regions of the U.S. The government subsidized the infrastructure resulting in the nationwide deployment of household electricity. The question that remains is whether the development of broadband rises to the same level of necessity as electricity. To subsidize a non-necessity would utilize public money to finance private market endeavors.

In Maine, two major taxation steps have been taken by state government to assist telecommunications development and high technology investment. This tax policy is an example of a tempered response to the taxation questions posed above. The high technology investment tax credit and the rescheduling of the telecommunications property tax have assisted the growth of telecommunications infrastructure without infringing upon natural market forces. Maine State Government has taken prudent and effective course through this policy arena. Looking at the two tax policy shifts give a good picture of a high technology friendly state, which allows competitive market forces to command the natural rate of investment and deployment.

High-Technology Investment Tax Credit

First enacted in 1997 by the 118th Maine Legislature, the high-tech tax credit was designed to attract businesses to Maine involved in computers and the Internet. If the state could entice high-tech enterprises to base operations in Maine, higher skill, higher paying jobs would be available to residents. The credit was amended by the 120th Legislature, redefining the requirements to qualify, after realizing the credit encompassed a much wider group of businesses than originally intended.

The credit is equal to the adjusted basis of eligible equipment on the date first placed in service in Maine. The eligible high-tech activities range from design and manufacturing computer software, equipment, and supporting communications components to the provision of Internet access services and advanced telecommunications services. Generally, the credit may not exceed \$100,000 per year, unless current-year credit base is less than \$100,000, in which case, previous years' carryover up to \$200,000 may be allowed.

This tax credit program is very helpful to businesses making significant capital investment in Maine. Moreover, the credit entices investment by smaller companies who may not ordinarily make a large investment in infrastructure.

Telecommunications Property Tax

²⁵ THE NEXT STEPS TOWARD THE LAST MILE, Prepared for the 120th Maine Legislature, Joint Standing Committee on Business and Economic Development, Joint Standing Committee on Utilities and Energy. Prepared by the Telecommunications Working Group, December 5, 2001

With the further intent of encouraging capital investment in telecommunications infrastructure, the 119th Maine Legislature began to adjust the tax rate schedule on telecommunications personal property. The mil rate will remain at the current level of 27 mills for property assessed before December 31, 2002; however, the rate will reduce over a period of seven years.

For assessments made in 2003-----	26 mills
For assessments made in 2004-----	25 mills
For assessments made in 2005-----	24 mills
For assessments made in 2006-----	23 mills
For assessments made in 2007-----	22 mills
For assessments made in 2008-----	21 mills
For assessments made in 2009+-----	20 mills

This reduction in property tax, over time, will make capital investments more attractive to telecommunications companies. These investments will provide additional advanced services to the consumer, improving connectivity to Maine citizens.

The Legislature, with the support of the current Administration, has made significant progress in providing tax relief to the telecommunications industry with the hope that continued capital investment occurs in Maine. Clearly, with several hundred million dollars of recent and planned investments in Maine, the telecommunications industry is committed to the improvement and expansion of current networks.

APPENDIX B –Technology and Means of Delivery Committee

BROADBAND ACCESS INFRASTRUCTURE BOARD

Report to Expansion Plan Committee from Subcommittee on Technology and Means of Delivery

Introduction

The primary task of the Broadband Access Infrastructure Board Subcommittee on Technology and Means of Delivery (BAIB-TMD) is to analyze and present the current range of physical modalities for the provision of high-speed Internet access. Our secondary task is to issue our recommendations for how these technologies might be implemented in the state of Maine or, if they are already in use here, how they might be expanded, enhanced, and optimized for greater efficiency.

Some of these modalities have a clear and established track record (e.g., cable, Digital Subscriber Line [DSL] service, Wi-Fi [802.11x]); others, such as Broadband over Power Lines (BPL) and Wireless Interoperability for Microwave Access (WiMAX), use technologies neither in final form nor in widespread use but are presently undergoing testing. Finally, there are services such as Integrated Synchronous Digital Networking (ISDN) that are falling into disfavor but which are listed on this continuum for the sake of comparison.

We have highlighted here some of the major advantages and disadvantages of each technique. It is widely and correctly observed that technology changes at a very rapid pace, often with rather tight cycles of innovation and obsolescence. Accordingly, an assessment of a particular technique of delivering broadband access today may not apply tomorrow. Therefore, a nimble and technology-neutral approach is the most likely to succeed, informed by lessons learned through the use of the technologies of yesterday and today.

The Challenge at Hand

The purpose of this matrix is “more descriptive than prescriptive.” It is the consensus of the Subcommittee that it ought not to be the task of Maine lawmakers to choose from among these modalities for a single, be-all-and-end-all solution for achieving the Governor’s goals vis-à-vis broadband. We foresee the most likely scenario as involving different means of delivery depending on the population density and current need of a particular area. Therefore, the best solution will emerge from an integrated, multilayered, tightly coordinated approach. In sparsely populated areas, wherein lies the greatest difficulty and most acute need in Maine, it seems that some form of wireless broadband is called for in many if not most situations.

Data communications is vital to the development of economic activity, the delivery of educational services, the participation of citizens in civil affairs and effective government. If Maine and its citizens are to thrive and compete in the society and economy of the twenty-first century, we need to have a network for all the state which is at least equal and hopefully superior to that found in other states and countries. The most likely means of reaching this goal is to create an environment in which all potential providers are actively working toward building new

capacity and improving the current infrastructure. To make that happen, we will need to examine all of the obstacles standing in the way of this objective, be they related to regulation, financing, taxation, etc.

Analysis

There are three general tiers of data communications consumers: Home, Business, and Enterprise, whose needs in terms of bandwidth, speed, reliability, and speed of data communications are illustrated in the table below:

Relative Needs of Three Classes of Data Consumers

	Home	Business	Enterprise
Description	The least demanding category. Usually consists of <u>single individual or family</u> in a residential setting.	This moderate-needs category includes most <u>small-to-medium-size businesses</u> and organizations.	The most demanding group, which includes the <u>largest companies with multiple sites; hospitals, universities, and government agencies.</u>
Bandwidth Requirements	Moderate.	Moderate to High.	Very High.
Synchronicity	Moderate. Asymmetrical bandwidth (upstream speed much lower than downstream speed) is generally acceptable at present but that tolerance may not last.	Moderate to High. Requires considerably more symmetry than Home users.	Absolute. Speeds must be equal both upstream and downstream.
Reliability	Relatively low. High uptime desirable but not usually guaranteed.	Moderate to High. More money, people, time, and resource are involved and so reliability needs are greater than Home users.	Highest possible. When an Enterprise data connection slows down or fails completely, negative effects are wide-ranging.
Security	Relatively low. Most security measures are the responsibility of the customer, not the provider.	Moderate to High. Identity theft is an ever-present concern. Businesses need to protect their customers and themselves.	Highest possible. Consequences of failure can be disastrous.

A well-designed and properly executed Expansion Plan must take into account the needs of all three consumer classes.

In addition, there are two general aspects of the delivery equation: *inter*-regional and *intra*-regional connections. The former, inter-regional connection, brings broadband access from the backbone to and from a particular town via a backhaul. The latter, the intra-regional connection, distributes the signal to and from various locations without the town. These are two separate problems requiring different solutions. Solving the inter-region connection problem would do much to remedy the low population density inhibitor cited above. Existence of a cost-effective inter-region connection to a town would make the formation of municipal networks or commercial competitive service offerings for the distribution of services within towns economically viable. Dedicated wireless/microwave may be suited to moderate inter-region connections, but have physical limitations and limited bandwidth. All the other long-haul technologies are wired, thus amenable to a fiber-optic medium. Because of its capacity and

future-proof technology, dark fiber may be the best inter-regional connection technology. However, even dark fiber may be supplanted by passive optical networking (PON) or gigabit passive optical networking (GPON), so that issue must be approached with caution. Whatever the particular technology, an investment in providing very high-speed wired connections, making it available for lease by service providers would be a wise use of public money in line with what is being done in a handful of other forward-looking states.

The problem of distribution within a town may be solved using any of the short haul technologies in the broadband technology matrix. Different ones may be better suited to the physical, demographic, and market challenges inherent in each region and town. However with the inter-region connection problem solved by dark fiber the competitive landscape is improved, making service options for distribution available.

Conclusions and Recommendations

In a large, sparsely populated state such as Maine, no single method of delivery of high-speed data access will work well in every region. For relatively dense regions, dark fiber appears to be the most promising and future-proof means of delivery at present, with variants of DSL and cable technology as reasonable second-tier alternatives to fiber. For the less-dense and truly remote areas of the state, some form of wireless broadband delivery appears to be the most workable and cost-effective solution, whether it be a long-distance application of Wi-Fi (802.11x), WiMAX (802.16x), and whether it is fixed or mobile will depend on emerging and/or current market conditions. Accordingly, whatever policies or regulations are enacted at the state level must be sufficiently elastic to accommodate a rapidly changing marketplace for hardware and delivery systems.

Maine absolutely requires a comprehensive plan for expanding the data-connection capacity of the state by means that are affordable, universally available, sustainable, and scalable. The resulting initiative can be modeled on initiatives already underway in others states. For example, the nonprofit North-Link program devotes \$10 million to build a 400-mile fiber-optic backbone network spanning six Vermont counties that will be leased by the state to Internet Service Providers. Similarly, in Virginia, the Southside Regional Broadband Initiative (previously called Regional Backbone/Roots of Progress) commits \$12 million to build a 700-mile fiber-optic network connecting five cities, 20 counties and 56 industrial parks in southern Virginia. Maine needs something on this scale or even larger.

Specific Recommendations

1. A bandwidth requirement for all three classes is a rapidly moving target, and the direction is always upward with a steep rate of increase. It is difficult to pin down a solid number. For example, the Federal Communications Commission (FCC) classifies an Internet connection of 200kbps as “broadband” without reference to whether that speed is upstream or down. That standard is consider by this Subcommittee to be out-of-date. Contrast this figure with what today’s typical broadband consumers of DSL are tolerating, but beginning to chafe at: speeds of 3Mbps down and 512kbps up. Therefore, we recommend that policies enacted as

part of this comprehensive program either not make reference to specific speeds or be regularly and carefully revised.

2. Create a permanent agency devoted to expanding broadband and providing information on broadband to the public, similar to the Vermont Broadband Board.
3. Examine (and, if necessary, revise) the Utility and Railroad Services Maine Utility Accommodation Policy to ensure that it is broadband friendly and that it takes advantage of “piggybacking” to help avoid the cost of duplicate labor, i.e., when road construction is being performed by the Maine Department of Transportation (MDOT), a simultaneous effort to lay fiber cabling could be done while the ground is already being worked.

APPENDIX C – Regulatory and Financial Assessment Committee

Chart showing methods of broadband delivery and a review of regulatory impacts.

(Adobe PDF Chart)

APPENDIX D – BAIB Sub-Committees and Goals

Broadband Access Infrastructure Board Sub-Committees and Goals July 14, 2005

The Board will focus on how to expand the availability of broadband services throughout the State to private homes, businesses, public and private educational institutions, research centers, and other entities that would benefit from such services. The Board's objective will be to provide for universal broadband access by 2010. (Executive Order)

Goals:

Improving access to high-speed telecommunication services is the most important state economic infrastructure issue for the new century. Whether for business, government, healthcare, or educational purposes, higher speed “broadband” access is increasingly becoming a necessity – not a luxury.

No state plan to improve infrastructure will be able to completely address all of the service problems and issues identified by this board. However, there are basic fundamental issues that must be addressed in order to make progress on all fronts. These “basics” can be classified as follows: 1) lack of available bandwidth (no advanced telecommunications services available); 2) lack of bandwidth at affordable prices and with quality service (inadequate market economics); and 3) lack of information on where broadband services are available (specific site location and installation timing information).

Subcommittees (first listed member is chair):

- 1) Service Availability Subcommittee – “Where we are now.”

The Service Availability Subcommittee will investigate and report on the following:

- a) Identify the current providers of broadband services in the State, the coverage area of each provider and the current penetration of each;
- b) Identify the resources that providers have dedicated to the expansion of broadband services;
- c) Identify regions in the State where broadband services is unavailable or where service characteristics or price are problematic;
- d) Identify regions that would benefit from broadband service; and
- e) Identify current broadband expansion efforts and the expected increased services and penetration associated with each.

Questions: Should there be requirements on all telecommunications and information carriers (both those currently regulated and unregulated) to provide specific network location and capability information? In addition, should quality of service standards should be developed and enforced so that businesses and

other purchasers of advanced telecommunication services are able to plan and not have business operations disrupted because of installation delays?

Members: **Reggie Palmer**, Kathy Hounsell, Peter Reilly, Brian Paul, Amy Spelke.

2) Technology and Delivery Mechanisms Subcommittee.

The Technology and Delivery Mechanisms Subcommittee will investigate and report on the following:

- a) Identify the types of broadband services available in the State, including the characteristics of each type of service such as typical available bandwidth and cost;
- b) Identify the benefits and drawbacks of the various available broadband technologies and delivery mechanisms, including service and cost considerations;
- c) Identify cost and technological barriers to expansion of various broadband service mechanisms to unserved or underserved areas of the State;
- d) Identify the cost of expanding broadband services into areas that presently do not have such services;
- e) Evaluate competing and emerging broadband technologies in relation to differing topography, population density, and other constraints encountered around the State of Maine;
- f) Recommend the types of technology best able to provide service to those areas that need it the most. Distinguish between lower (residential and small businesses) bandwidth needs and the higher requirements of institutional and large businesses;
- g) Identify how broadband services could be used in unserved or underserved areas of the State.

Members: **Sam Elowitch**, Fletcher Kittredge, Scott Morrison, Gerry Dube
Chris Johnson, Phil Lindley/Amy Spelke.

3) Regulatory and Financial Assessment Subcommittee.

The Regulatory and financial assessment Subcommittee will investigate and report on the following:

- a) Identify current federal, State or local regulatory policies, requirements or barriers that promote, impede or affect the deployment of broadband services, including the “One Gigabyte Initiative” and open access legislation and their impact on availability of broadband services;
- b) Identify current funding sources for broadband infrastructure investment, such as Federal loans and grants and other federal, State or local government incentives;

- c) Identify potential investors and partners willing to increase broadband penetration;
- d) Calculate the economic impact that increased broadband penetration would have on the State, and identify how this impact would benefit the investors who undertake to expand their broadband coverage;
- e) Recommend legislation regarding state taxes (property, income, BETRS, PTZs), franchising and fees, certifications, affiliated interest transactions, ROWs, and access to information resources. Consider other tax incentives and infrastructure grants for low-use communities.

Questions/comments. We should strive for tax and permitting fairness. Differing rules discourage investment. From a business climate standpoint, why should different carriers have to play by different rules? A level playing field for ALL (regulated and non-regulated) broadband carriers should be established – including, but not limited to, competitive local exchange carriers, incumbent local exchange carriers, long distance/long haul carriers, resellers, wholesale (dark fiber) carriers, wireless carriers and cable modem or “advanced” telecommunication cable service providers (excluding traditional cable television service).

Members: **Brian Paul**, Steve Ward, Jason Philbrook, Melinda Poore, Kathleen Case, Phil Lindley.

4) Expansion Plan Subcommittee – “How we get there.”

The Expansion Plan Subcommittee will investigate and report on the following:

- a) Determine the needs and goals for penetration of broadband services in Maine;
- b) Recommend a specific broadband expansion plan for the State;
- c) Propose any specific legislative or regulatory vehicles – including any funding or incentive mechanisms – for the implementation of a broadband expansion plan.
- d) Develop measures of success.

Members: **Pat Scully**, Kurt Adams, Janet Yancey-Wrona, Peter Reilly, Jill Goldthwait, Reggie Palmer, Sam Elowitch, Brian Paul, Phil Lindley, Amy Spelke.

APPENDIX E – Other States

- Summary of other states' activities:
 - ConnectKentucky – To bring high-speed internet service to all state residents by 2007.
 - Michigan – LinkMichigan. Economic Development Corp. funding. Michigan Broadband Development Authority, low-cost funding through tax-exempt bonds.
 - Nebraska – Internet Enhancement Fund program, to provide financial assistance to install and deliver broadband throughout the state.
 - Louisiana – LA Broadband Advisory Council
 - California – “Gigabit or Bust.” Tower permitting process for expedited period to permit towers and poles. Digital Divide account, funded from 15% of lease revenues from the use of wireless telecom facilities on state owned land
 - Alaska – DECD grants (\$15million, from USDA)
 - New Hampshire – Municipal bonds for constructing, improving, and acquiring broadband facilities. No. NH Telecommunications Master Plan
 - Vermont – Broadband Council, grant program. Econ. Development Council of No. Vermont, \$10 million project using US Dept. of Commerce and other sources.
 - Kansas – KUSF funds for “KanED” (not just for wireline telcos).
 - Colorado – Multi-Use Network to connect rural areas (grant program).
 - Hawaii – Technology Renovation Tax Credit.
 - Idaho – IDANET to bring broadband to rural areas by aggregating state money and being anchor tenant.
 - Minnesota – Broadband access availability account to provide grants to projects and underserved areas, from surcharges on communications carriers.
 - Mississippi – Broadband Technology Development Act, provides tax credits and sales tax exemptions to companies investing in rural broadband deployment.
 - Montana – Tax Credit for Broadband Investments, 20%.
 - North Carolina – Rural Internet Access Authority, programs and grants.
 - Oregon – Broadband Tax Credit, 20% against personal and corporate income tax.
 - Pennsylvania – The Ben Franklin Technology Development Authority, provides funding for grassroots projects.
 - Tennessee – Rural Internet Access Authority, oversees, manages, and monitors efforts to provide broadband to rural counties.

GLOSSARY

BAIB (Broadband Access Infrastructure Board) a body of appointees of the governor charged with issuing recommendations in support of the data connectivity portion of the Connect Maine program.

BPL broadband over power lines a technique for delivering high-speed Internet access over electrical power lines, with the ability to use house wiring to connect to computers.

Broadband an elastic term describing high-bandwidth data connections. The wider the pipe, the more data can be moved at the same time and hence the higher the effective speed. The FCC defines any connection greater than 200 kilobytes per second in one direction as “broadband” and a connection with 200kbps in both directions as “advanced broadband,” but these figures are almost universally deemed to be out-of-date. A typical broadband connection today is closer to 512kbps upstream and 2Mbps down and moves upward from there. In a few years, that number is likely to be significantly higher. The term “broadband” is often used as shorthand for “high-speed Internet access.”

business user a user in a business setting constituting a broad “middle class” in terms of bandwidth, reliability, and security needs. See also *home user*, *enterprise user*.

cable internet a means of delivering broadband via coaxial cables, almost always simultaneously with cable television service.

central office this is a switching station maintained by an ILEC where DSLAMs are generally deployed and from which the maximum range of DSL service (reckoned in “circuit feet,” distances over twisted-pair copper lines, not “as the crow flies”) can be determined.

CLEC Competitive Local Exchange Carrier

ConnectMaine, (aka, ConnectME) the Governor's initiative to expand cellular and broadband coverage.

DS3 a digital signal carrier with a rate of 44.736Mbps.

DSL digital subscriber line. There are many subtypes of DSL (VDSL, HDSL, etc.) of varying speed, range, and technical characteristics, typically asynchronous with downlink rates currently of 3.0Mbps to 10Mbps.

DSLAM digital subscriber access multiplexer.

enterprise user the most demanding, industrial strength broadband consumer that usually represents large, technology-intensive organizations.

fixed wireless a non-mobile method of delivering broadband service.

FTTH/FTTP fiber to the premises, home, et al. a method of connectivity using fiber optic cabling.

home user the class of broadband consumer with the least demanding broadband needs but which also faces total unavailability of service in many areas

ILEC Incumbent Local Exchange Carrier

interregional connectivity the process of bridging a particular regional node to the Internet backbone.

intraregional connectivity the process of bridging a particular node to points within a region or town.

ISP. Internet Service Provider.

last mile a term for the most remote and sparsely populated areas that are among the most challenging to provide with broadband

municipal network a broadband network owned and operated by a city or town, often by lease arrangement with an ILEC/CLEC. The right of Maine communities to establish these networks was recently reaffirmed by the State Legislature.

narrowband low-speed data connections (such as dialup Internet access, which tops out at 56kbps and is generally even lower in real-world applications).

OCx Optical Carrier service provided over fiber optic cable

PON passive optical networking a family of networking standards using a point-to-multi-point architecture for delivering last-mile connectivity without any active (i.e., powered) components in the distribution network. PON may provide hope for a last-mile solution because it involves fewer upgrades to the current infrastructure than competing technologies.

symmetrical/asymmetrical describes whether a data connection operates at the same speed when traveling upstream as it does when traveling downstream. A symmetrical connection is the same speed up or down; an asymmetrical connection is usually slower on the upload than on the download.

synchronous/asynchronous describes whether a communications stream is completely continuous (synchronous), or can occur at any time and at irregular intervals (asynchronous). Most connections between computers, including those connected via broadband, are asynchronous.

T-1, synchronous copper-wire based transport service (aka T-carrier) with a rate of 1.544Mbps.

take rate or penetration, a measure of the ratio of potential subscribers to whom service is available to those who actually sign up for that service.

triple threat or triple play, an emerging application of broadband that delivers voice, data, and video over the same pipe

WiFi wireless fidelity a very popular form of wireless networking in the IEEE 802.11x family of standards that is generally used for connectivity of wireless large-area networks (WLANs) inside buildings and small outdoor areas, but which has shown remarkable usefulness as a way of providing high-speed Internet over wider distances via towers, high-gain antennae, and mesh-network technologies that significantly exceeds what WiFi was originally intended to do.

WiMAX Wireless Interoperability for Microwave Access a newly ratified form of fixed wireless broadband access in the IEEE 802.16x family of standards. The licensed version has a theoretical range and distance of up to 30 miles and 50Mbps or higher but is only available to the larger carriers. WiMAX is said to be able to overcome some of the topographical issues faced by other forms of wireless broadband, but this has not yet come to the marketplace.